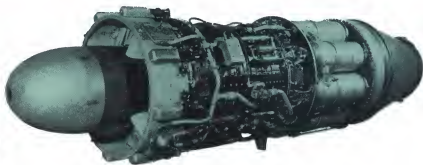


# AVIATION WEEK

FEB. 18, 1952

A MCGRAW-HILL PUBLICATION

50 CENTS



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AIRCRAFT: First Jet Carrier Photographic Plane, Navy

F2H-2P Banshee, Produced by McDonnell

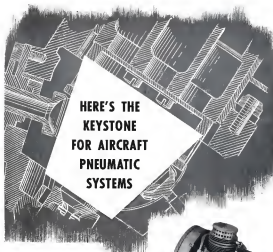
ENGINE: Westinghouse J-34 Jet

METERING SYSTEM: Holley Turbine Control



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AVIATION PRODUCTS

## WHO'S WHERE

### In the Front Office

Tom Davidson has been promoted to vice president in charge of the Aircraft and Missile Design of Dana Stool Co., San Los Angeles, Calif. He has been responsible for improving the Aircraft Division's tooling system and getting the ship for production. John S. French has been named vice president of the Office of Defense Products, Ford Motor Co., according to Richard E. Kuehn, recently named technical assistant to the vice president and general manager and the operations manager of the Lincoln Motor Division. French was with General Motors Co. from 1944 to 1959, joined Ford in 1957.

Arthur F. Flind has been designated as director vice president of the Fairchild Engine & Airplane Corp., will also continue as controller. He joined Fairchild in 1938 at Fairchild, La. 1. When the present corporation was formed in 1946 he was put in charge of all financial activities of the North division.

### Changes

William H. Hayes, Jr. has been named chief manager of General Wright Corp. Electronics division at Garden N. J. He has been in electronics since 1937, with RCA, National Research Council and Ford. Radio & Telephone Corp.

Leslie F. Flind has been named to fill the newly created post of assistant general manager of Bell Aircraft Corp., Buffalo N. Y., in addition will continue as secretary and treasurer of the firm. Richard S. Hurd has been named Washington, D. C. representative of Bell, succeeding G. B. (Bert) Clark who was manager of contracts for Bell's F-16 Verti helicopter division.

Yusuf N. Ferguson has been appointed chief technical engineer of Texas Instruments & Mfg. Co., Inc., Dallas, Tex. was as recent chief industrial engineer for North American Aviation's Texas division during World War II.

Ray L. Mervin has been named district sales manager for Air Force section of the government sales department in General Electric Co.'s Electronic division. He will report out of Dayton, Ohio.

W. R. H. has been designated public relations manager of Boeing Airplane Co.'s Wichita division according to Rex Haden who reported recently. Haden's former post as news bureau manager is being filled by Gordon K. Whitely.

Elvis Emerson Ruff, formerly U. S. public relations representative for Air Force, now is managing editor of "Aviation" magazine.

James Johnson and Herbert McQuinn have been added to the public relations staff of V. V. Roe Canada, Montreal, Que. L. F. McGill has been named industrial manager of the company's aircraft division.

Lawrence L. "Bob" Ditz and Henry G. Lander will jointly handle Capital Aircraft's sales effort in Texas.

## INDUSTRY OBSERVER

► First Pacer T1121 scout helicopter fuselages have been delivered to the plant at Morton, Pa., by Goodrich Aircraft Corp. for installation of powerplants, transmissions, rotor systems instruments and equipment. First of the T1121s is expected to fly the spring without many prototype problems, since the craft is a build-up development of the Navy HRP with more power and the HRP is already put on quite a few hours in Navy and Marine test program.

► Typical of the way some component makers are getting better in the cut-throat in Air Force programs is the cancellation of the Republic Division, General Motors Corp. program to make Aeromaster propellers for the Fairchild C-119. The \$250,000 program is cancelled without, as far as could be learned, a replacement contract for the Republic company.

► Estimates are that approximately 10,000 new machine tools and 25,000 tests from the service have been put out as defense plants since the Korean conflict started. Two small engine plants, Lycoming at Troy, Conn., and Kinner/Conner at Detroit, have been virtually completely retooled for production from reserves, DPA sources say.

► Boeing's four-engine B-47C airplane is waiting for a full complement of Allison J71 engines at Wichita and is due to fly sometime in the next few months. But there is Air Force official indication that the Pratt & Whitney J57 engine will probably be the engine to go into the four-engine B-47 in a production version.

► Some publishers warning aircraft manufacturers and military planners as results could go higher into operations include the following facts: The Practical limit of visual recognition of a target by a fighter pilot varies between 5 and 15 mi. But an airplane traveling at Mach 3, clearly within the realm of present planning, will travel 15 mi. in less than a half-second. Also reinforced flight at Mach 3 will heat an uncooled cockpit to a deadly temperature. These are trends which it appears to be a more pressing future the graded studies than for piloted aircraft interceptors.

► Despite talk about replacement of the Convair B-56 by Atlas jet bombers, the big bomber is now the best operational long-range A-100s carrier the U. S. has, and will continue to be for perhaps two years to come. So it is important news that Convair-San Diego has completed the modification of the last of over 100 B-56s and its to include jet engine pod installations embedded in the piston engines originally installed. The means that Strategic Air Command now has a formidable fleet of the subsonic bombers ready to shoot at an aggressor in addition to most new B-56s coming off the Convair B-71. Worth has.

► Besides the X-45 eight jet supersonic successor to the B-56, Convair is producing another subsonic/mach bomber replacement candidate, probably a redesign. Reports are that it can be powered by a turbo-prop version of the Turbo Wasp (T5) Supracore with a turbo-prop version of the Pratt & Whitney JT.

► New type test requirements for turboprop propellers are being prepared by the propeller industry for consideration by the U. S. military services as a result of a recent meeting between Norm Baker, Air Force, and propeller company representatives.

► Technical data interchange on jet engines between the Hamilton Aircraft Ltd. and General Electric, has been approved by USAF and previously by British MoD. While there may be some latent cross-fertilization arrangements or support of similar U. S. or British design, there is no indication of such arrangements in connection with the data exchange.

► Curtis Propeller division recently won a USAF contract for a high-speed turboprop propeller and gearbox to be used on the Convair-Wright JT Supracore turboprop version. Reports are that the propeller and gearbox may be tried on a turboprop version of the Boeing B-47 as well as on a Convair long-range turboprop bomber. The turboprop B-47, attractive because of its longer range potential, has been subject of USAF interest for two years or more.







11



# Scott

## AIRCRAFT OXYGEN BREATHING EQUIPMENT

### THE SCOTT "A-15"

Portable Automatic Diluter Demand Oxygen Walk-Around Assembly.

Standard equipment on U.S.A.F. bombers, cargo and personnel carriers. New units in production and available to airplane manufacturers.



### TECHNICAL DESCRIPTION

U.S.A.F. Type A-1 Cylinder and Regulator Assembly consists of U.S.A.F. Type A-15 Low Pressure Diluter Demand Oxygen Regulator. (Designed and produced by Scott) Automatically mixes air and oxygen, supplying correct air-oxygen ratio for all altitudes up to 34,000 feet.)

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For Increased Cockpit and Protection to Sup-plementary Oxygen.

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## AERONAUTICAL ENGINEERING



## Seibel Copters: A Study in Simplicity

- Unique design of control eliminates swashplates.
- And hub section is given indefinite life by CAB.

Seibel's helicopters meet easily the world's toughest test, aren't parts, their structural framework and open cockpit look much like a flying test bed from a production craft. But there is no denying that the cox have the simplest rotor system currently seen in the sky.

Five years ago when the Seibel S-3 first flew (the S-3 was a 55-hp experimental craft built by Claudio M. Seibel, the company president) it carried a power structure in the rotor wing. And a little more than two years ago, the second copter, S-4, was introduced by the CAB after less than two years of development time and less than \$50,000 chargeable to that development.

More recently, Seibel Helicopter Co. is in the aviation headlines again. An agreement is being made between the officials of that company and the Cessna Aircraft Co., like Seibel, located in Wichita. While final details of the offer are still nebulous, it is known that Cessna has offered to purchase Seibel by paying Cessna stock.

Such a move would place Cessna in a commanding strong position as a supplier



SIMPLICITY of hub design shows in structural angles and tubes for pitch change

of liaison craft—it now produces the majority of fixed-wing liaison planes by giving it a powerful contractor in the field of growing importance.

Seibel's design have been described before in AVIATION WEEK (Oct. 23, 1950), but the details of the copter—particularly of the hub and control assemblies—are sufficiently important to

warrant a second and closer look. Under Test-The Seibel S-4, recently evaluated by the Army Field Forces and the U. S. Air Force, in a two-seater liaison copter. It offers a simple solution to the inherent problem of rotary wing craft. In the S-4, the passenger, the cargo and fuel are all located at the center of gravity directly



of the cubic stick displacement

• **Tail Rotor Drive**—Detailed study of the problems of driving the tail rotor caused the Scihel engineers that there was only one solution which gave the lightest, cheapest and most reliable rotor drive system. And so they conceived a thin-walled drive shaft of large diameter to turn at a relatively low speed.

All Seifert copiers have used a tail roller shaft the complete length of the tail beam with bearing supports only at each end. With only two jack supports, there is no problem of alignment. Lubrication problems are minimized and structure to support additional bearing, is unnecessary.

The tail rotor drive shaft operates between the first and second critical speeds. During low speed operation of the engine, the shaft passes through the first critical, collection of the shaft during that phase is handled by a simple friction damper at the center of the shaft.

• **Transmission Cases**—The gear box for the lifting motor uses two gears and four bearings. The gears can be bought over the counter in retail automotive supply stores; the bearings are either industrial or automotive and can be obtained from any retail bearing source.

Maintenance of the gears and bearings is comparable to automotive units.

Flowering of the plant has to start from maximum carbon

The tail rotor gear box is similar to the lifting rotor gear box. It also uses two gears and four bearings which can be purchased from standard industrial stock.

These simple, gross boxes, the unsophisticated rules lead the tail rotor down all understore Sabel's efforts to make copters erect to build and erect to maintain. And linguistic production of the rest should be a crash.

## Console Set-Up

## Convair Sets Up Missile Division

Cushman of a separate Graded Muscle Division, announced by Consolidated Vultee Aircraft Corp., underscores that company's increasing emphasis on research, development and production of graded muscle.

Domestic head for Corvair will be Gary Irving, new manager of the firm's guided missile activities at Pomona, Calif. Chief engineer for the new division will be C. R. Irvine.

Immediate effect of the move is to integrate the records unit into the bank.

ties at San Diego, Coors' headquarters. There will be in addition to the plant now being built by Coors at Pecos in the production of Tervis, slip board and mouth mask.

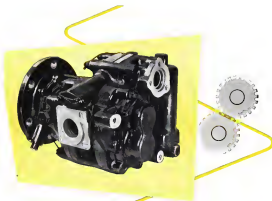
All good news activities, particularly underway within the corporation will be brought under the new division. This will include electronics and pyrotechnic activities, which are related to the main-line business.

## Aeronautic Postgrad Competitions Open

Two competitions for graduate studies in acoustics have application deadlines of May 1, 1952.

Direct and Financier Guggenheim Jet Propulsion Fellowship will be awarded for graduate study at Princeton University and the Colorado Institute of Technology. Fellowships carry an annual stipend ranging from \$1,000 to \$2,000 plus tuition. They are open to qualified college graduates with suitable engineering or scientific undergraduate preparation. Candidates must have outstanding technical ability, demonstrated leadership qualities and deep interest in rockets and jet propulsion.

Applications and descriptive booklets



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may be obtained from the Foundation, 730 Broadway, New York 1, N. Y. Twelfth annual competition for the Amelia Earhart scholarship for graduate study by a woman in aeronautical engineering has been announced by Zonta, international organization of executive and professional women. Candidates

must apply to the chairman of the scholarship committee, Miss J. Winn Ford Hagler, Aeronautics, Syracuse University, 580 South Center Ave., Syracuse 10, N. Y. Award (\$1,000 grant) will be on the basis of character and ability. Candidates must have a bachelor's degree.

## Highlights From IAS Conference

These digests reviewed Aeronautics Division presentation of subjects discussed at the 25th Annual Meeting of the Institute of the Aeronautical Sciences in New York, Jan. 28-Feb. 1. Other summaries appeared previously.

### Aerodynamics

• Development of Flow Fields for Use of a Jet Engine Tunnel, John D. Reid, Langley Research Center, NASA.

A jet jet technique which is useful in visualizing the flow fields about aerodynamic bodies and bodies of low speeds is described. This technique involves photo-graphing the action from jet downstream of a gas injector of jets of sodium light scattered as a tracer.

This procedure permits obtaining, in an approximate manner and with a minimum of effort, a vector plot of the flow field in a plane normal to the jet stream of a ribbon blade as aerodynamic surface.

The general types of techniques in providing physical explanation for the character of flow field data and in visualizing aerodynamic phenomena is discussed and examples of the application of the technique to particular problems related to the chordwise growth of lift and stall effects of combinations of lifting surface contours.

• Simplified Laminar Boundary Layer Calculations for Bodies of Revolution and for Freezing Walls, N. Rott, Associate Professor of Aeronautical Engineering, and L. F. Chubb, Research Assistant in Aeronautical Engineering, Graduate School of Aeronautical Engineering, Cornell University.

Since the introduction of numerical methods a boundary layer calculation by a Kármán and Pohlhausen type approximation has been proposed. Recently Thwaites has achieved a clarification in the meaning of these procedures, which opens the way for the generality of boundary layer problems. Thwaites has discussed the maximum possible interaction between the maximum velocity gradient, maximum wall shear, and the maximum boundary layer thickness. Using these relations from known start values, he gives a particularly simple method for calculation of the transition and laminar boundary layer.

It is shown that these methods may be extended beyond the Thwaites term local to integral bodies of revolution. Furthermore, an application to swept air wings is presented here as a modification of the usual momentum thickness of the flow downstream flow is required.

After a general discussion of the role of the boundary layer in the flow processes, its development is specified after inspection of flow over and upper surface solutions for infinite span elliptical bodies.

A theoretical relationship is found by which the actual solution of the spinar boundary layer flow is reduced to a quadrature. Examples are given of the present application of this technique.

A discussion of the corresponding point theory for subsonic boundary layer flows was held on the application of the well known techniques in this case.

### Aircraft Design

• Electro-Thermal Methods of Aircraft Design, J. L. Cox, Head, and G. K. Rishi and J. H. Mikes, Research Engineers, Naval Weapons Laboratory, Naval Air Station, Orlando, Florida.

Thermal methods of predicting aircraft and their components against sea frame data allow the best prospects for achieving complete effectiveness with minimum stress. The "aircraft design" principle has been extensively developed and is currently recognized as the most effective design principle with the advent of higher flying speeds and gas turbine engines, the quantity of heat required for complete air preheating has become a concern.

A second "design" principle is presented, a great reduction in total heat requirements can be obtained. The design process during design must not be merely applied to propulsion and it is now coming into general use. This application is described and applied to power systems, heat distribution and coverage are discussed.

In the extension of this principle to the wing where removal was first applied to the conventional design, it is necessary to put the aerodynamically stable air cap by a continuously heated "jetting" strip along the upper surface. This development is described and various aspects including power system, heating system, structure and control are discussed.

On bodies which include areas of high pressure, electro-thermal methods of prediction have been developed and also advantages in return applications, particularly for the compressor cooling.

Representative electro-thermal driving system for a transport aircraft fitted with turbojet and turbo-propellers, various methods are outlined for the purpose of power and weight data.

It is concluded that electro-thermal work on all prediction can be applied with advantage to many of the great problems of modern aviation.



## Building the World's Best Aircraft...

For example, the  
**CONVAIR T-29...**  
on the final assembly line  
at the Convair-Corbin Plant  
in San Diego, California

T-29 transport aircraft (based on the Convair-Corbin transport) is working in with all Convair-Corbin's aircraft in San Diego. Eight of the latest T-29s (built by Pratt & Whitney) planes are shown in the background. They will soon be flying "Convair-Corbin" in the first phase of flight testing.

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• DRAFT OF THINGS TO COME. Internal design of the aluminum extrusion process and the design application of products. Running time 22 minutes.

• FAST OF THE POWERED POWDER. Development of aluminum powder and products including their applications in protective and decorative finishes. Running time 22 minutes.

• RDS AND PROGRESS. The complete story of aluminum from mine to finished product. From its origin to its development. Running time 22 minutes.

Write to Reynolds Metals Company, 2845 South Third Street, Alameda 4, Kentucky



## REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



## PRODUCTION

### Bell Employs 1,326 Handicapped

Physically disabled make up 12% of firm payroll, and pay off in high attendance, efficiency.

There are lots of physically handicapped people. There's an industry (bird shorting, too) And there's consumer products. But there are many industries where these handicapped individuals can take up that manpower slack.

More important, there's a continuing payoff in industry for these physically handicapped—they can often fill in as times of seasonal expansion as well as in an emergency period—contributing to the opinion of many in management who don't think so.

What the exploitation of these physically disabled can and how industry can give them a place on the team to bring out their efficiency is being forcefully demonstrated at Bell Aircraft Corp.

► **They Do Do-Scramble!** Can't do, sole here for Bell's opening of these handicapped people throughout the plant. Bell's proof that this category of workers fit into the industrial scheme, not only as important staff jobs but in the shop as well, stems from a long-time study and record of past test experience with handicapped people—stating, back when the idea was first conceived, that the company was biased in 1955.

In fact, so drastically has Bell shown that a "handicap" can be so unimportant that, Bell's corporate has the same understanding today for the employment of physically handicapped workers as any employer in the State of New York. This fact alone makes the company record covered by the National Association for the Handicapped.

In Bell's total of 11,000 employees, there are 1,326 of these "disabled" workers—about 12%. Veterans in this category of handicaps number 943—about 23% of all veterans (4,101) in the plant.

► **Top Officer—Bell Aircraft's** motto on the value of disabled workers has been eloquently put by Executive D. (Larry) Bell, the company's president:

"A company does not need an AF-American handicap to do every job. It uses its manpower to suit. But we have learned by experience that more of our jobs are being performed well as can be physically handicapped as they would be if all Americans were doing the job."

► **An aspect** like the involvement of the physically handicapped can be too often approached with duplication. The secret of such a step is really more



LOVE of an arm in World War II did not stop Earl Morn from becoming a top stock room clerk in the Bell aircraft production team.

simple, than some appreciate. Recently, it talks only for close teamwork of company and state departments of a letter and a line of the outside agency, with on the local state as national employment services, in the Veterans Administration or those agencies which promote the needs of the disabled.

► **All means** an understanding of the position of the physically handicapped is essential but, again, this is also the simple matter of creating opportunity. The capabilities and the limitations of the lower handicaps.

► **To say** discussion with persons in industry and business is one essential that there is a great understanding of the basic things involved in the employment of the disabled and that, but for this understanding, there would be some sense companies utilizing the abilities—learned or otherwise—of these people.

► **"The disabled** are not looking for handouts or charity. They are all very keen to establish themselves as good citizens and to care for themselves. They want a place as we citizens."

► **All Bell Aircraft**, we have found these efforts to be efficient and successful, their attitude wonderful, and their at-

titude means high above the average for our entire industry."

There's a pretty good reason for this, particularly in the light that since of these workers have very accurate knowledge. There are big and small companies, those with mixing tanks and lagers, totally deaf, athletes cars, variously disabled, but in sight, multiple disabilities, and other disabilities of similar proportions.

► **How Bell's Approach—All Bell** also means recognizing help through the employment office must give a complete description of the job to be filled. Then, plus detailed data on every job in the plant and office, gives complete information on understanding of all tasks in the company.

The medical department works into the scheme, too. The physical examination has jobs set on a just with those of other plants in the area, but to set up a fine approach in hiring of handicaps, the medical general standards and maximum physical requirements have been lessened. Because of this, the applicant is examined and considered in the light of the specific job he is asked to do.

The medical staff determines whether the projected job can aggravate the applicant's disability or possibly bring on other injuries. In this examination the doctor makes data on the physical limitations of the applicant.

If he can't do the work, Employment will be, to dig up another job line in or to assign the job another person. If the job, so that it can be done with no danger.

► **Many Spots—At a general rule**, the jobs open to the handicapped are the same as those open to the able-bodied—handicapped, stock and production control clerks, equipment assistant and assistant check clerks, and skilled and semi-skilled factory personnel.

There is, in fact, with the experience department, too—in telephone, operator, technical publication activity and in the stock control office in a. The telephone openings have excellent opportunities for advancement. Most of the disabled is of the telephone work importance, since the telephone work is so simple. Good night at one eye is expected, combined with the ability to use well-handled tools.

► **An Example—Here's** a typical example of how Bell will fit one of these men to a shop job. A vet came a long time back to the shop, also had a basic job that contained a drive. One experience he had was obtained in a job-related high school machine shop course, and was in the machine shop working to work. The shop foreman was called in and considered the problem.

Result: A drill press was fitted with a hand-operated control instead of its

own automatic foot lever, so the vet could operate the machine without any standing. It's doing a job, then what he's doing and is not becoming a skilled machinist through some special training program.

Bell's engineering division has given a long way to fit disabled people into jobs usually held only by the able-bodied.

Track was to break down the activities so that various phases of the work could be performed by the one trained as handicapped as possible. Engineering recognized it, training programs, too, for those who had only theoretical or very limited practical experience, and through this approach was able to use a considerable number of handicapped workers.

► **Advancement—Bell** realizes that it isn't a "dead end" road for the disabled workers. Just one instance: One vet couldn't stand for any length of time because of a neurological condition of his feet. He had worked as a part-time telephone operator and he went into Bell's plant as a telephone public address announcer. His personality, not evident, and as a matter of course he was doing clerical work in production control. His ability advanced him further to the job of production control scheduler.

Any employee can be in production with any other opening, as long as he or she is qualified. This advancement opportunities not only protects union men, but company policy protects and union workers as well.

► **Safety Follow-Up—These** additive safety measures are responsible to it, in fact, that all production activities. These safety men work closely with the medical department to see that the conditions of the employment are observed. A disabled worker is not allowed to provide checks are made with each team to make certain the health isn't being endangered, and these make the plant physician's no reference are examined at regular intervals.

There are other life services extended. If it's difficult for one of these workers to make his way through a crowded area at change-of-shift, he gets no worry if he isn't seated in line at the cafeteria, let's arranged a special area where the train is over and so served space in the parking lot opens him close to the station for a maximum of walking.

► **Responsibility—How** do these handicapped workers need? Bell wants that an almost even mixture of men relying and dependent workers, who support their spouses, and their families of five categories is less than half of 1%.

How do the supervisor meet? Bell says that, time and again, the "hums" have expressed the desirability of having

more workers of this type. They like the cooperation these handicapped people and their ambition to work. pag 10.

Management has never been any it has followed its policy of utilizing these disabled workers.

### Ryan Backlog Up

Ryan Aircraft Co., San Diego, revealed up the old year by gaining \$6 million worth of new contracts in the first month of new contracts in the first month of new orders than a half dozen years ago. Orders were for aircraft and vehicle components and aircraft engine accessories.

By single order in the year 1970 was one that more than doubled the quantity of big Ryan-designed external fuel tanks for language operations.

The new orders, which more Ryan's backlog to more than \$16 million, are placed by General Electric, Continental Motors, Boeing, General, Douglas, Lockheed and others not disclosed.

Continental ordered for exhaust systems, having contract last year worked with Ryan contract to extend service life. This will be used on Continental 1700 engines and for tanks and other items under contract.

This backlog extends the company's production schedules into late 1974.



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24 ST 4  
75 ST 6

### or Aluminum Tubing?

24 ST 3

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# ENGINEERS

wanted at once  
for  
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AIRCRAFT PROGRAM**

by  
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Los Angeles, California  
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Unusual opportunities for Aero-  
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established training time paid.  
Salaries commensurate with ex-  
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Please include summary of  
education and experience  
in reply to:

**Engineering Personnel Office  
SECTION 3**

**NORTH AMERICAN  
AVIATION, INC.**  
Los Angeles International Airport  
Los Angeles 45, Calif.  
or  
Columbus 16, Ohio



YF-105S receive some of the 100,000 tons of USAF world air to keep in Europe.

## AF Show Draws Foreign Suppliers

(McGraw-Hill World News)

Frankfurt—Over 1,500 German cars,  
trucks and their sports backed into  
the former U. G. Pavilion building in  
Frankfurt on the last day of a week-  
long "Material Exhibit" put on by the  
U. S. Air Force in Europe.

Of the over 100,000 different items  
which the Air Force would like to buy  
in Europe under the terms of its off-  
shore procurement program, actually  
only 500 were on display. Compre-  
hensive lists of all categories of items  
desired by the Air Force were handed  
out, businessmen viewing the exhibit,  
together with detailed questionnaires  
which, when returned, will give

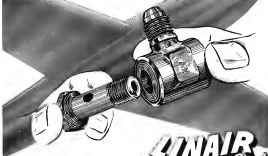
USAF a pretty complete picture of  
"what is able to manufacture what for  
us."

Roads German manufacturers, repre-  
sentatives from France, England, Nor-  
way, Belgium, and Denmark also at-  
tended. Air Force officials were de-  
lighted with the general response and,  
on the basis of contracts they received,  
felt that the off-shore procurement pro-  
gram in Europe, and especially Ger-  
many, was going to get a very heated  
response.

The exhibit ran in Frankfurt from  
Jan. 28 to Feb. 1. Air Force officials  
expect that, on the basis of the great  
German showing, similar exhibits will  
be held this year in Paris and Rome.

Exhibitors, who shared space with 175,  
400 tons of  
F-105s, F-4s, F-100s, F-101s, F-102s,  
F-104s, F-105s, F-106s, F-107s, F-108s,  
F-109s, F-110s, F-111s, F-112s, F-113s,  
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## EQUIPMENT ENGINEERING

### Turbo Compound: Transport Fuel Saver

- First radical change in U. S. airline engines.
- Ram air cooled turbine promises long life.

By George L. Christian.

Wood Ridge, N. J.-Introduction of Wright International's R-3350 Turbo Compound engine into American civil aviation will mark the first radical change in gas turbine configuration used by U. S. scheduled airlines.

Ray T. Barker, president of Gaston Wright Corp., recently announced one of the largest orders ever placed for an air engine—511 engines for the Turbo Compound.

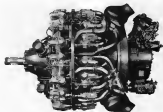
With practically no exceptions, six-cylinder more powerful, larger radial engines have been the standard motive power for American sky transport.

In contrast, European airlines have run the gamut of radial engine types. In addition, four Diesel-powered DeSoutour-Dugout boats. And the British have, as yet, not had a three distinct types of aircraft propulsion being considered. Examples are the radial engines you find in the Vickers Viking, the Vickers Viscount carrying telephone powerplants, and turbo-compound in the Lockheed Constellation. The U. S. Navy has been the only operator of the compound engine to date, having flown them for several months 50,000 lb. on Lockheed P2V-4 patrol bombers, but is searching for a solution concerning the engine which is to be developed in foreign engine purchasing.

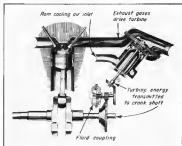
►What is it? The Turbo Compound engine will see first commercial service on 52 M-1554C Super Constellation in December, 1952, and described, on Eastern Air Lines Super Constellation about six months later.

The engine is essentially a standard R-3350 supercharging engine with an efficient power recovery system introduced between the power and accessory sections. In this "new" section exhaust gases are directed through three vanes in radial flow—downward, where energy is transferred to the exhaust gas (exhaust) through fluid coupling (two gas turbine).

Speed of the engine's exhaust, according to company officials, is the low-down turbine which absorbs energy from the exhaust without appreciable



SIDE VIEW shows two of three turbines on power recovery section behind power section.



SCHEMATIC drawing of mechanism of power recovery of Turbo Compound engine.

increasing back pressure. They say that back pressure created by the turbine is comparable to jet exhaust static back pressure. When open at a constant 7.5-1 ratio one could lift 100 ft.

►What is it? These are the major advantages of the compound engine as cited by Wright International Corp. • Approximately 20% increase of power

during takeoff and climb. At cruise, operators have the option of maintaining usual fuel consumption and increasing horsepower by 10%, or keeping previously used power settings and saving 20% on fuel consumption. Take off power is 3,150 hp dry, 3,500 hp wet at sea level. Maximum cruise power of the compound engine are

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proportionately higher than for the standard R-1310. Engines are intrinsically improved fuel economy of 384 hp at 1,200 hp, low blowers, and low specific weight of 1.66 lb/hp (including in haul options) are reported for the engine.

• Maintenance should not increase appreciably. Although there are some moving parts to the compound engine, it is also a more accessible powerplant. Turbines are directly accessible and should not get too hot because of the relatively low temperatures (600-800°) and runs (17,000) at which they operate. Diameter of the wheels is 14 in.

The manufacturer states: "Overhead of the entire power assembly system is most shops will require only two special fixtures, purchased with the engine, and if not already on hand, one new machine for balancing the turbine wheels."

The only parts essentially not in operation not having turbocharger charge equipment will be the turbine wheel, main assembly, cooling fan and final coupling. All power is conveyed to the turbine without requiring engine removal. Overhead of the Turbo Compound engine is domestic engine operation will require \$4,900 and require 400-500 man hours. The total objective of 1,600 hours between overhauls is an ideal operation seems likely.

Company officials added that there were having less maintenance problems with the compounded version of the R-1310 than with the uncompounded engine. Reason for looking up at some critical parts of the compound such as the cylinders. Wright Aero engineers pointed out that cylinder life on the C-1310 engine was running at high as 1,000 hr. They also stated the fact that the Turbo Compound cylinder has 4½ more in area and 8 in pounds more than the 700 cylinder. After being maintained the maintenance's statements concerning the Turbo Compound engine. There are some better comments to Aviation Week.

The engine has no drastic trouble history. One driver, who is an experienced pilot, based on service experience with the engine. Added whether the compound engine required appreciably more maintenance than the conventional R-1310, the Navy replied: "Minimal maintenance only is required." He also said that it is a "bump" with the compound.

After concluding his evaluation of the Turbo Compound engine, the Navy stated: "There's definitely something with this engine. We have been overcome by more positive of a series of design improvements, most of them in the power recovery system. The Navy is not going to be positive to conduct flights of the 100° version of the engine."



R-1310 engine evolution:

Top: C-1310, and low: Ws. 415 lb; in 1,200 hp in.  
Middle: C-1310, and low: Ws. 415 lb; in 1,200 hp in.  
Bottom: TC-1310, and low: Ws. 512 lb; in 1,400 hp in.

• Noise suppression of the power system is appreciable, both in and outside the aircraft. This is particularly important because of its constant power requirement of 100 hp. Noise by power plant near or far from the aircraft is a major concern in a jet engine, especially on long haul flights. The engine has been tested equipped with the compound engine, so that it is naturally quieter, a further contribution to passenger and crew comfort.

• Simplicity of control of the engine is stressed. The compounding system is automatic control in the cockpit. • Status of the compound in the state as on the non-compounded R-1310. Engine oil used in the fluid coupling drain out of the main when the engine is at rest. Result is that some starting trouble is the same as the non-compounded R-1310 since the turbine is not spun when the crankshaft is first tested one, because of lack of oil pressure.

• Cooling Poles: The engine was first flown in the fall of 1910 in the case of a R-1310. Interesting sidelight of the operation is that, because the large diameter compound engine propeller is the same as the standard engine propeller and not inordinately vibration, and heat at takeoff power the R-1310.

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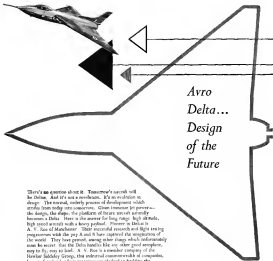
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## 36 HARTMAN RELAYS PROTECT BOEING'S B-47 BOMBER



GE-18 18-Tube Control Panel  
Photo Courtesy Jack & Henry  
Hartman Electric, Inc.

Mindful of the lightweight efficiency and trouble-free performance of Hartman remote control circuits and other electronic military and civil circuits, Jack & Henry called on Hartman to supply vol-

tages for the J&H GE-18 control panel installed in the Stratus.

Each of the aircraft's six generators is protected and regulated by an individual GE-18 control panel equipped with five Hartman relays

- (1) **Differential Voltage and Reverse Current Relay**—Closes generator to bus when generator voltage exceeds battery voltage, disconnects generator from bus upon removal of excess.
- (2) **Ground Fault Relay**—Senses ground fault, when fault exceeds set value, closes circuit breaker generator.
- (3) **Overvoltage Indicator Relay**—Senses load current to detect generator producing overvoltage and automatically sets its overvoltage relay to trip at lower voltage than other line relay.
- (4) **Breaker Relay**—Disconnects regulator equalizing circuit from equivalent bus to avoid pulling system voltage down when generator is inoperative.
- (5) **Overvoltage Relay**—Senses overvoltage and cuts out generator. Relay has circuit time characteristics to prevent nuisance trips.
- (6) **Constant and Droop Relay (No Short)**—Assists in feeding unit main bus, one of three constant units, each controlled by a GE-18 panel, connect and disconnect generator from bus during both starting and generating conditions.

Typical of Hartman design and construction, relays in the B-47 are just a few of the many electronic circuits engineered for the military industry. Whenever your problem involves electronic controls, turn it over to Hartman

where it will receive prompt attention . . . where it will be analyzed and engineered with an efficiency that comes from nearly half a century of specialization.

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MANSFIELD, OHIO

relatively modest temperatures at which they operate. This inherent problem was finally solved by afterburning which occurred during long approaches made with rich mixtures, high rpm, and low power. Inherent exhaust heat nature was blown on to the tailburners, and sufficient oxygen was furnished by using cooling air to induce combustion in the tailburner wheel. Simple solution to this problem was to increase the tailburner's exhaust heat shield.

► **Range Stretcher**—The long sought after engine goal of consistent outstrip flights, both transcontinental and transatlantic, with maximum in efficiency never perhaps should at last become a reality with Turbo Composed powered aircraft.

Lockheed Aircraft Corp. has been a strong sponsor of the compound engine and points up the powerplant potential with these concrete guarantees for the H90C Super Comet.

► **Nonstop New York-London**. Combustion 54 passengers, 5 crew members, emergency stairs, several baggage loads and all small fuel reserves. Time 10 hr 45 min. (The Super Comet can carry more than 64 coach passengers, LAC adds.)

► **Overstop London-New York**. Good time same as above. The guarantee specifies the first leg as being the 1,500 mi leg, London-Gates. There fore, it is reasonable to assume that Lockheed is only in a position to guarantee nonstop transcontinental flights, outlanded as well as west.

The advantages of nonstop operation in time, cost, and individual unit and low on engines, cannot be overstated and indicate the obvious.

► **Next Step**—The R-5150 first built of Wright Aero's production line in 1977 at an 18-cylinder, double row engine developing 3,750 hp. Today, thanks to turbo-compounding, the engine has a 5,700 hp rating, just.

Has the engine reached the limit of its possibilities? The water, at least, wouldn't what power could be wrung out of the powerplant if intercooling were applied to exhaust gases between cylinders and before? And, if the intercooling were installed, would sufficient power remain to the exhaust ports to drive a turbo-compressor? In the latter configuration, Wright would probably be making an on-site machine out of a reciprocating engine.

Wherever approach Wright Aero takes, one thing seems to be the R-5150 Turbo Composed engine has already reached its limits of power output or performance.

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### Safer Plane Test

An improved means of testing air craft engine exhaust piping for weak spots caused by heat erosion, etc., is provided with development of the "Magne-Pulse" by American Instrument Co., Inc.

The gadget does away with the "haz" test tapping method now used. In

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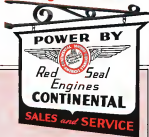
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tion, exhaust systems are provided with a full pipe hanger until work area goes dry. Sometimes good pistons are damaged, but spots caused by hammer.

The new method is more direct and gives. An electrical probe is passed over the metal surface to detect flaws. Damage spots are indicated when a meter reads a certain value. The tool also then is marked off, following which the part is patched or replaced. The "Magne-Probe" can be used in the same manner to test soundness of welds, according to the maker. Another advantage listed is that it can reach areas not accessible to a hammer.

Development of the tool is based on early experiments by Max Grosshansky, Pan American World Airways engine inspector at San Francisco. He found welds and brittle areas on exhaust piping because permeable to magnetism and that permeability of stainless steel and Inconel alloys increased on direct relation to the change in crystal structure caused by excessive heat.

To use this information, the Magne-Probe is a sensitive and stable bridge which measures the inductance of a coil whose core is the structure being tested. Inductance of the coil is proportional to the permeability of the core, thus a measure of the heat corrosion of the structure tested.

Often credited by American buyers need for help in developing the device are D. Fowler, M. W. Numbler and W. J. Spaulding of the Civil Aeronautics Administration, Copley, W. H. Diller and W. H. Dwyer, and W. S. Leachman of Bellini Field AFH, and R. Stovell of Capital Aeronautics Engineering Co., Inc., Silver Spring, Md.

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This 250-watt, 100% duty, 1000 rpm motor, 100% duty, is 1/2 inch high, 1 1/2 inch wide, 1 1/2 inch deep, for a 1/2-in. x 1 1/2-in. x 1 1/2-in. motor with G-E silicone insulating material.

Larger lots of electrical equipment at high temperatures—resulting in important savings in space and cost—has been demonstrated—made possible with a new class of General Electric silicone insulation. The "Class H" insulating material provides an unusually high thermal capacity. It withstands temperatures up to 450 F for limited periods, has a compressive strength of 10-15 degrees. Fiberglass above conventional insulating materials.

G-E silicone insulation offers engineers new opportunities to design motors for heavy-duty jobs. Excursion motors, often subject to high operating temperatures and mechanical abuse, are being built with expensive and field coil is wound with glass-enclosed tapes insulating a bonded with G-E silicone varnish. These coils don't shrink or loosen at extremely high temperatures... has again become they stay right on the machine.

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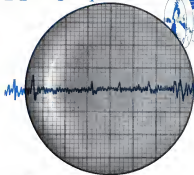
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starts with  
processing  
research!*



*Our problem was clear.  
We at Aeroproducts knew what we were after—  
a propeller with the stamina to handle  
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for at times it seemed impossible to design  
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the problems of tomorrow.



## AIR TRANSPORT

### Call for 2-4-Engine Planes About Even

- Airline orders for twins total 219, four's 182.
- Each type has individual operational advantages.

In the continuing hot competition for new air transport sales, U.S. twin-engine and four-engine planes still are running virtually neck-and-neck, while airline customers continue to weigh the competitive merits of both.

This is revealed in the latest transport production schedule approved by the Federal Aviation Administration in its scheduled C-3 program (see page 17).

New orders approved for DPA projects this quarter total 35 four-engine transports and 31 two-engine. That's 34 DC-6s, 1 Convair 440s, and 35 Comets. Total firm orders for delivery from 1952 to 1954 show about the same thing: 182 four-engine and 219 two-engine transports in firm order so far for delivery in the 21 months from Jan. 1952 to June 1954.

► **The Good Debate**—The debate has been going on for a long time about the merits of two-engine and four-engine transports. The latter has the advantage of greater economy on long-haul and/or higher-density routes. That's no argument on these two new contenders. But there's better reason to do when it comes to picking the plane to fit the average route system, which may have some short hauls and some longer hauls along the same route.

► **Two-engine planes** cost less to buy, to operate, and to maintain. But when it comes to picking the plane to fit the average route system, which may have some short hauls and some longer hauls along the same route.

► **Four-engine planes** cost less to buy, to operate, and to maintain. But when it comes to picking the plane to fit the average route system, which may have some short hauls and some longer hauls along the same route.

► **Two-engine planes** cost less to buy, to operate, and to maintain. But when it comes to picking the plane to fit the average route system, which may have some short hauls and some longer hauls along the same route.

► **Four-engine planes** cost less to buy, to operate, and to maintain. But when it comes to picking the plane to fit the average route system, which may have some short hauls and some longer hauls along the same route.

### Average Costs—DC-6 and Convair 240

(Half year 1953, all positions)

	Douglas DC-6	Convair 240
Cash/seat flown	\$190.00	\$129.58
Average load, passengers	248	292
Cash/seat flown	\$0.74	\$0.63
Seat available	18	40
Cash/seat available	\$3.01	\$0.16
Payload seat available	7.05 tons	10.02 tons
Cash/available ton mile	\$0.112	\$0.173
Payload available in terms of passenger weight equivalent	70.5	39.2
Cash/passenger mile available in weight equivalent	\$0.002	\$0.017

\*Passenger weight equivalent is assumed as 160 lb.  
\*Equals cost per 200 lb. payload available per mile flown.  
SOURCE: CAAI data compiled by Air Transport Assn.

from the actual 1950 airline costs of flying the two types shown in the table. This is chiefly because the costs are a result of less the planes were actually used and because the previous versions were used.

Wicks tables showed what would happen if the planes were used with equal utilization on identical schedules. The theoretical cost per passenger mile was calculated as follows: Wicks, Dec. 10, shows that lower seating arrangement in the standard DC-6 makes it less economical than the Convair 240 for shorter hauls. But that's not all, and the 1950 table also shows that each seating can bring about a change in the picture.

► **Cost Comparison**—If a twin takes advantage of the full available capacity of a DC-6 is, according to cash seating, the four-engine plane can stay with the two-engine plane on the right down to the short haul of around 300 mi., the figure shows. (About half of U.S. airline tickets are sold for flights under 100 mi.)

Cost per mile is higher for the four-engine plane. But the cost per available payload is not necessarily as high. Traffic density of the potential market is a vital factor in the decision, if it is viewed from the standpoint of the airline. If the market for a DC-6 is 150 mi., say it costs to fly 200 passengers, the four-engine DC-6 cash plane will last less than twice that of two Convairs. If there are only 40 passengers, the Convair will last about a third as long.

### AA Predicts U. S. Jet Liners in 1958

How the biggest money-making air line in the world sees the future financial and equipment buying picture of the decade is revealed by American Airlines Vice President Theodore W. J. Rogers in a paper presented to the Society of Analysts of Los Angeles.

► **The American Airlines view it**—U.S. jet transport will be flying in 1957 and "will be available for commercial operations during the year of 1958."

► **Turboprop transports** will cause a couple of years of more later and will be used on runs of around 500 mi.

► **U.S. built jets will be better than British planes** of the de Havilland Comet type.

► **AA will spend \$75 million** on new flight equipment by 1962, in addition to the \$50 million now committed to new orders for conventional aircraft. This is in addition to about \$15 million in ground facilities that will be built total American Airlines capital requirements of \$150 million from now until 1962.

► **The DC-6** will be the top in performance, said the plane job start thing, reports about 1955.

► **The present cost** will contract for services through the first half of the year, Rogers believes.

► **Air transport rates** must rise if oper-



strong costs are constant, going up.

- **CAB is always behind developments in aircraft.** One year ago the CAB's Hagen says. Later in 1950 the Board raised coach fares when costs were falling. In late 1951 "the CAB opened up" and the fares were too high and forced the carrier to lower them. Apparently the Board has not studied the latest trend of increasing costs in the industry, or at least has not given due weight to this factor.
- **AA earnings have averaged** "a little over 15% on invested capital during the 17 year period since its organization in 1934." Average return on investment since the war has been only 4.75%, however, only the last two years' return has been "satisfactory."
- **A 1951 income gain of 1952** is expected (this won't be as great as in 1951).
- **SWP is too low** for a year round transcontinental or coast-to-coast "and must be considered as a seasonal fare." The seasonal value, eventually will be a discount rate for last year's service for the standard service. American will have more last-day seats on its coast flights coast-to-coast than standard fare seats this year.
- **Last year's cost** was much more "and over the longer haul it will come down."

## Emergency Spares Supplied to Airlines

Emergency supply of spare parts to the airlines by the Air Force is being individualized scheduled and unscheduled days from about one spot shortage a day to the first month's operation of the new CAB/M emergency supply program for the airlines.

Airlines faced with spot shortages have policies set from military supply in three out of every four cases to date, according to N. S. Nelson, chief of the Aircraft Requirements Division of CAB's Office of Aviation Delays, Reopen, month.

Under this system, the airlines apply to CAB for supply and from Air Force to relieve spot shortages of engine, engine, engine and propeller.

- **How It Works.** The system is going smoothly, even though it's the first month of operation of the emergency program, Nelson says. There was no provision for engines and propellers help it that because Air Force and Navy help they already were short in those three branches. The engines and propellers are now part of the program, following a recent AF decision at the Office of Deputy Chief of Staff of USAF, Materiel.

There's hope the system works.

- **CAB** covers the airline requests,

turns the need and passes to a carrier to turn to Air Force. Air Force tries to fill or replace a need first by scheduling priority of airlines on Air Force stock, if that isn't practicable, USAF checks its own stock, if it can't supply the needed part, Air Force checks with Navy. If all else fails, CAB then checks with the National Production Authority to see if a duplicate could be produced.

- **Of over 30 applications** presented to date, three out of four have been immediately from Air Materiel Command stock.

- **For Different Items.** CAB reports that 50 applications have been received for different items. The industries that the shortages are all individual spot shortages, so far it appears that there's no overall item on one item although engines are in high supply.

Motors, wheels and components of them are over 20 times the volume of airline orders. So with engine shortages nearly missing in individualized spot requirements CAB and the Air Force figure that the new military emergency aid to airlines will keep the airlines flying without draining military stock of its one item.

## Post Office To Push Low-Cost Air Mail

Post Office Department wants to throw in low-cost air mail over higher rate carriers in the dispatch of mail.

The Department is not now doing this, but they will ask for the authority when House Interstate and Foreign Commerce Committee, special hearings on legislative streamlining the operation of mail pay from airline subsidies.

American Wings was told.

"Good business sense would suggest that the Post Office get the most reasonable rate on mail transportation," says American Wings was told.



ST. LOUIS AIR TERMINAL

The new \$10,000,000 terminal has been opened in the Heart of the City, St. Louis and even from World War II, Eastern lines and Mid-Continent Airlines. The terminal started among the public in 1946.

Post Office Solicitor Louis Doyle commented. "The Postmaster General is of the view that the Department cannot be bound to use legitimate carriers whose low-rate carriers are available that afford similar service. The Department is not precluded in using such legitimate carriers when the mail would be expedited, thereby, otherwise, and traffic usually would go to the line offering the lower favorable rate."

- **7 Mail Categories.** This policy would establish the list of mail carriers, expressed during Senate hearings last year by Capitol Airline President J. H. Connors. He predicted the closing of mail business to big carriers, Connors said that the same rate of mail pay be given of lines operating a route.

Civil Aeronautics Board has established seven categories of mail rates, ranging from 45 cents a ton-mile for the Big Four to 57.25 a ton-mile for a group of small local lines.

Separation legislation, as passed by the Senate, bars the Post Office from favoring low rate carriers over higher rate carriers in mail business. It provides that the Postmaster General "shall not delay, and or withhold mail from an air carrier because the rate for the transportation of mail payable to such carrier can be higher than the rate payable to a competing carrier."

## Subsidy Free Mail Rates Set by CAB

Delts Air Lines has a show-case order from Civil Aeronautics Board setting a mail per cent of 51 cents a mail ton-mile, retroactive to Oct. 1, 1951.

CAB says Delta's 1952 operating profit before mail pay is forecast by the company at \$2,750,000. Net profit after taxes would be \$4,211,000 before mail pay. This is a return of 12 1/2% on the Sept. 30, 1951, investment made by Delta.

Revisions require CAB, Delta "is no longer dependent on a government subsidy for mail." CAB estimates 53 cent rate will yield Delta \$974,000 mail revenue in 1952.

Other airlines CAB says can operate at competitive subsidy-free mail pay rates are:

- **At 45 cents** a ton-mile, American, Eastern, TWA and United.
- **At 53 cents** a ton-mile, Capital, Northwest and Western.
- **Capital's** first rate is set at 57 cents.
- **Norfolk's** 33-cent rate is temporary. Northwest has a show-case order paying temporary rate of 55 cents.
- **Western's** rate is open now, Western has just submitted its request of operating contracts to CAB.



**BORN TO BE A BATTLER:** Latest in a long line of top aerial aircraft—stretching back three decades—the Chance Vought F7U Corsair brings new striking power to the Navy's

air arm. This new, sleek, twin-jet, tailless fighter for carrier operations was designed to be second to none in speed, climb, maneuverability, ruggedness and fire power.

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Mr. C. G. Jones, Salary Personnel Department

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**AIRCRAFT CORPORATION**  
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## EDITORIAL

### Crashes & Brass Tacks

It couldn't have happened. But it did. By tragic coincidence, three transients within two months have parachuted into one congested square mile in Elizabeth N. J., killing at least 116 persons—plane occupants and observers in their houses.

Now that a National DC-6 has hit an apartment after failing to complete a Newark takeoff, the Port of New York Authority has closed the airport. Newark Airport had operated 23 years on Oct. 21. There were no fatal airline accidents in the area for 21 years. The last previous fatal accident killed two occupants of a lightplane in 1931.

Yet let us never forget that in this one community the record and memory of 20 safe years was wiped out in two months. Newark Airport was closed by public opinion, not by reasoning, logic, or law. Public opinion is not always right or logical at first, but it can be all powerful. It is most amazing when it is unprepared and aviation failed badly, to answer Elizabeth's criticism of news in recent years.

There is more to learn from Elizabeth than even the total question of whether Newark Airport, or any other major airport, is closed permanently or temporarily. The future of our own industry may lie in jeopardy.

But we have seen the totally unpredictable indignation of an entire community much misdirected but still being about as free both the responsibility of all flights at one of the country's greatest commercial airports.

Let us at last realize the full power of an aroused public opinion—its emotion, the speed of its gathering steam. Death to those who fly has always been a tragic thing, but death also to innocents in their homes is now fast becoming intolerable to the public generally, not just in Elizabeth.

As good as we in aviation think our safety record has been, the public is surely deciding it is not good enough.

It is time for a general tightening-up in operations and a hard-headed inquiry even into our basic philosophy of commercial aviation that dictates aircraft design and operation.

As with any other product of man, there can be no 100% safe airplane. Just where do we draw that mythical line between the airplane that is so designed for safety or so filled with safety equipment that it will carry nothing else, and the equally unacceptable plane that carries the maximum load without any safety consideration at all?

Have we made too many compromises in the wrong direction in design, manufacture, and operation? Are our aircraft and our operations too complicated, too loaded, unsatisfactorily safe?

These are basic questions probably no one in aviation cares to tackle now. But if we don't for the sake of safety, we may well have disastrous public opinion on our hands nationwide—not merely in the single community of Elizabeth.

### Bell Doesn't Handicap Them

Bill Arnold Corp. is the first member of the aircraft industry to be awarded a national American Legion award for employing handicapped veterans. Its program was judged the most effective of any business employer in New York State.

Next June the Disabled American Veterans will present the company its national award.

These honor programs as achievement over the years that has won two little national and industry awards.



LAWRENCE BELL, president of American Legion award for employment of handicapped veterans from George R. Bell, Port of New York State Legion employment chairman. The Legion's National Commander, Donald A. W. Davis, looks on.

For Elizabeth in today's *WEEKLY* is told the story of the Bell philosophy and its sharing results. It's a great story.

Bell Aircraft now employs 1,326 disabled persons, of whom 945 are veterans. This means that almost 32% of Bell's employees are handicapped physically. But they are not handicapped in their opportunities, so earn a living and advance in aviation.

President Lawrence D. Bell has learned there is a continuing place in industry for the physically handicapped. They can earn their way in normal times as well as in an emergency period.

Mr. Bell, in accepting the American Legion award, made it very clear that other employers in the aircraft industry need have no fear of technical, labor or legal complications after the original arrangements and policies are formulated. All of these basic problems have been overcome at Bell Aircraft.

Bell's enlightened and humane policies are paying off big to the company and community as well as to the individuals themselves. At Bell they're not handicapped. Lawrence Bell's leadership should be an inspiration to the rest of the industry.

—Robert H. Wood

► New Northwest Airlines saves ground time in mid-air! With the Sperry Engine Analyzer installed in all Northwest Airlines' Stratofliners, flight engineers can get a continuous visual picture of each engine's performance while in flight. Graphical patterns on the Analyzer scope locate and identify irregularities in power plant operation.

► Upon landing, flight log information directs maintenance crews immediately to those parts that require servicing... avoids prolonged engine running on the ground.

Result: Northwest Stratofliners spend more time in the air—less time on the ground.

► Sperry's Engine Analyzer is the first complete instrument provided for aircraft to isolate detailed engine difficulties. This instrument pays for itself in a matter of months. Aside from saving ground maintenance time, it also enables the flight engineer to maintain proper operating techniques at all times.

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► The Sperry Engine Analyzer reflects this company's many years of experience in the precision manufacture of instruments designed to aid aviation.

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